

An integrated washing agent dispenser, in particular for a dishwasher

The present invention relates to an integrated washing agent dispenser, in particular for the pivotable door of a dishwasher.

More specifically, the subject of the invention is a dispenser device comprising, within a support body or structure

a first device for dispensing a washing agent and a second device for dispensing a rinse agent,

an electrically controlled actuator device, coupled to the first dispenser device in such a way that a first commutation of the actuator device after the door has been closed dispenses substantially only the washing agent, and coupled to the second dispenser device by a transmission mechanism which includes a pivotable interconnecting element;

the said interconnecting element being able to make the transmission mechanism inoperative when the door of the machine is opened and to make it operative after a first commutation of the actuator device subsequent to closure of the door.

Dispenser devices of this type are known in the art, for example from the documents DE 33 04 037-A and DE 195 35 153-A.

In these prior art devices, the aforesaid interconnecting element of the transmission mechanism is coupled to a movable member controlling the device for dispensing the rinse agent by means of a two-arm lever or rocker extending into the region between the rinse agent dispenser and the washing agent

dispenser. In such devices the actuator is essentially constituted by an electromagnet, arranged at the rear part of the integrated dispenser device, behind the receptacle for detergent powder.

Prior art devices such as that described above have a relatively complicated transmission mechanism, the size of which limits the space available for the rinse agent receptacle. In addition, the fact that positioning the actuator behind the washing agent receptacle is practically unavoidable means that the integrated device is of considerable size, especially its thickness, in the portion forming the rinse agent dispenser.

One object of the present invention is thus to provide an integrated dispenser device which overcomes the limitations described above with regard to prior art devices.

This and other objects are achieved according to the invention by providing an integrated dispenser device of the type defined above, characterised in that one end of the said interconnecting element is pivoted directly onto a movable member controlling the second dispenser device.

Further characteristics and advantages of the invention will become apparent from the detailed description which follows, provided purely by way of non-limitative example, with reference to the appended drawings, in which:

Figure 1 is a perspective view of an integrated dispenser device according to the invention;

Figure 2 is a rear elevation showing part of the dispenser device of Figure 1, in a first condition;

Figures 3 to 5 are similar views to that of Figure 2, showing the dispenser device in successive operating conditions, and

Figures 6 and 7 are sections taken on the lines VI-VI and VII-VII respectively of Figure 5.

In the drawings, and in particular in Figure 1, an integrated dispenser device according to the invention is generally indicated 1 and is intended to be fitted to the inside surface of the front door of a dishwasher.

The door of a dishwasher is usually hinged to the body of the machine along its bottom edge and can be opened into a substantially horizontal position (loading position) in order to place utensils needing washing in the washing chamber or to remove them after washing, and a vertical position (working position) in which the door closes the washing chamber, preventing any liquid from escaping during operation.

The integrated dispenser device 1 fitted to the door of a dishwasher is therefore also moved in operation between a horizontal loading position, in which it can be filled with detergent and rinse agent, and a vertical working position, in which the device faces into the washing chamber and is operable to dispense detergent and rinse agent, during the wash and rinse cycles respectively.

In the present description and in the appended Claims, the terms detergent or washing agent should be understood to mean any type of detergent or soap used in a dishwashing cycle. The term rinse agent should be understood to mean any product that can be used to improve the shine on clean items.

The integrated dispenser device 1 includes an elongate body 2 of a plastics material, to be fitted into a corresponding aperture provided in the door of a dishwasher.

The body 2 can be made in two parts for example, a main or front portion and an auxiliary or rear portion respectively, both produced by injection moulding and then connected together and heat welded using a hot blade device.

With reference to Figure 1, a receptacle 5 for containing a quantity of detergent is formed in the front surface 3 of the body 2 which will face towards the washing chamber of the dishwasher.

A lid 6 is pivoted on the body 2, with a seal 7 fixed to its inside surface, for sealing the detergent receptacle 5 when the lid 6 is in the closed position shown by the broken line in Figure 1. In a manner which is known per se and thus not shown, the lid 6 has an associated spring urging it into its open position, illustrated by a solid line in Figure 1.

A rocker 8 is mounted for rotation on the front portion of the body 2, adjacent the receptacle 5, its two arms ending in hook

members 9 operable to engage corresponding retaining members 10 provided in the lid 6 for holding it in its closed position.

The rocker 8 is mounted for rotation on a shaft 11 which passes through the body 2, projecting from the back of it, as seen for example in Figure 2.

A dispenser for a rinse agent, generally indicated 4, is incorporated into the body 2 next to the detergent dispenser device 5, 6. In the embodiment shown by way of example, this device includes an essentially cylindrical seat 12, formed in the front portion of the body 2, with a rotatable dispenser device, generally indicated 13, arranged therein.

In the embodiment shown by way of example (see Figure 6 in particular) the rinse agent dispenser 4 includes a dispenser chamber 14 with a delivery aperture 16 formed in its bottom surface 15 with an associated movable shutter 17. This shutter 17 is essentially tubular in shape, with a closed lower end which forms the shutter itself. A control rod 18 is force fitted into the tubular shutter, the upper end 18a thereof protruding upwardly into the rear portion of the body 2 of the integrated dispenser device, as shown for example in Figure 2.

With reference once more to Figure 6, the aperture 16 opens into an underlying duct 19 intended for conveying the rinse agent into the washing chamber of the dishwasher (see also Figure 1).

On the rear of the body 2 of the dispenser device 1 (see Figure 2), an electromagnetic actuator or electromagnet 20 is mounted in the area between the detergent receptacle 5 and the rinse agent dispenser 4, with a movable core 21 projecting from the bottom.

The lower end 21a of the core 21 is operatively coupled to a lever carried 22 by the shaft 11.

The distal end of the lever 22 has a shaped formation 22a with an upper projection 22b from which a stop projection 22c projects transversely (in the direction of the observer in Figure 2) (see also Figure 6), the function of which will be described later. In its lower portion, the formation 22a has a recess or cavity 22d, the bottom wall of which is indicated 22e. The upper, or upwardly facing portion of this wall 22e has a vertically elongate through aperture 22f.

With reference to Figures 2 to 7, an interconnecting element linking the lever 22 and the control member 18 of the shutter 17 of the rinse agent dispenser 4 is generally indicated 23. In the embodiment illustrated, the interconnecting element 23 is in the shape of a right-angled triangle. This shape is not compulsory however.

At the substantially right-angled tip of the element 23, an arm 23a projects from the surface thereof facing the body of the dispenser device 1 and is snap engaged in a passage 18b in a shaped formation 18c on the rod 18, near its end 18a (see Figures 6 and 7).

The shaped formation 18c has opposite terminal extensions 18d and 18e, slidably engaged in respective grooves 24 and 25 in the body 2 in such a way that the rod 18 can translate parallel to its longitudinal axis but is prevented from rotating about this axis.

The transverse passage 18d in the formation 18a on the rod 18 is such that when the projection or arm 23a of the interconnecting element 23 is held therein it is able to oscillate both about the longitudinal axis of the rod 18 and about a transverse axis, indicated A-A in Figure 7.

With reference to Figures 2 to 5, the longer side forming the right angle of the interconnecting element 23 has a rientrant portion 23b whereby it rests against the stop projection 22c on the lever 22 under the force of gravity.

With reference to Figure 2, it will be noted that the centre of gravity of the interconnecting element 23, indicated G, is spaced by a distance d from the vertical plane B-B containing the axis about which the interconnecting element 23 pivots about the control rod 18 of the rinse aid device dispenser 4. The interconnecting element 23 therefore tends naturally to pivot, anticlockwise as viewed looking at Figure 2, and bear against the stop 22c on the control arm 22.

A transverse projection or pin, indicated 26 in Figures 2 to 6, extends from the surface of the element 23 facing the body 2 of the integrated dispenser 1, at the corner formed by the longer side and the hypotenuse.

In the operating condition shown in Figure 2 (dishwasher door closed but actuator not yet excited following this closure), the feeler pin 26 on the interconnecting element 23 bears against the outer surface of the control lever 22, outside the recess 22d and the adjacent through aperture 22f (see Figures 2 and 6).

The dispenser device described above operates substantially in the manner which will be described next with reference to Figures 2 to 6.

It is assumed that the door of the dishwasher is initially open, that a quantity of detergent powder is placed in the receptacle 5 and that the associated lid is then closed and clipped to the rocker 8. It is also assumed that a plurality of doses remains in the rinse agent dispenser.

With the dishwasher door open, gravity causes the interconnecting element 23 to be positioned in such a way that the feeler pin or projection 26 is disengaged from the terminal shaped formation 22a on the control lever 22.

When the dishwasher door is closed, the dispenser device 1 moves into the position illustrated in Figure 2: gravity causes the interconnecting element 23 to bear against the stop 22c, with its feeler pin 26 against the side surface of the control lever 22 outside the recess 22e and the through hole 22f.

Once the dishwasher is started, when it is time for the detergent in the receptacle 5 to be delivered into the washing

chamber, the control unit of the appliance excites the electromagnetic actuator 20 for a first time. The core 21 thereof is "sucked" upwards, causing the control lever 22 and the associated shaft 11 to pivot from the position shown in Figure 2 to the position shown in Figure 3. This pivoting of the shaft 11 causes a corresponding pivoting of the rocker 8 resulting in the lid 6 being released and, under the action of the associated resilient means, moving into the position shown in Figure 1, thereby opening the receptacle 5 and allowing the detergent contained therein to fall into the washing chamber.

With reference to the passage from Figure 2 to Figure 3, it should be observed that, thanks to the effect of gravity, the interconnecting element 23 remains in contact with the stop 22c on the control lever 22, as a result of the rotation of this lever 22, the pin 26 on the interconnecting element 23 "drops" into and engages the recess 22d in the terminal formation 22a on the lever 22.

As soon as the electromagnetic actuator 20 is de-energized, the device moves from the condition shown in Figure 3 to that shown in Figure 4. With reference to this last drawing, the movable core 21 of the electromagnetic actuator 20 moves back into its initial position, thereby returning the lever 22 and the shaft 11 to their starting positions. The rotation of the lever 22 from the position of Figure 3 to that of Figure 4 causes the feeler pin 26 of the interconnecting element 23 to be positioned facing the aperture 22f in the terminal formation 22a of the lever 22 and to drop by gravity into this aperture. Since the pin 26 is held in the aperture 22f, the

interconnecting element 23 remains spaced from the stop projection 22c.

As the wash cycle continues, when it is time to release a dose of rinse agent, the control unit of the appliance excites the electromagnetic actuator 20 for a second time, causing the dispenser device 1 to move from the condition shown in Figure 4 to that shown in Figure 5.

The control lever 22 rotates anti-clockwise, and after rotating freely at first the lower edge of the aperture 22f encounters the feeler pin 26, moving it and the entire interconnecting element 23 upwards, causing a corresponding upward movement of the control rod 18 associated with the shutter 17. This shift causes the end portion of the shutter 17 to move away from the associated aperture or seat 16, allowing the rinse agent to flow from the dispenser chamber 14 into the delivery duct 19.

Once the rinse agent has been dispensed, the electromagnetic actuator 20 is again de-energized and the dispenser device 1 as a whole returns to the condition shown in Figure 4. As the wash cycle continues, it is possible to dispense additional doses of rinse agent, by re-energizing the electromagnetic actuator 20 and causing the dispenser device 1 to move once again from the condition of Figure 4 to that shown in Figure 5.

On completion of the wash cycle, when the door of the dishwasher is opened, the interconnecting element 23 disengages again under the effect of gravity from the shaped terminal formation 22a of the control lever 22.

When the door is re-closed, operation resumes in the manner described above.

It is clear from the aforesaid operating description that if the door of the dishwasher is opened and then closed again during a wash cycle, the dispenser device 1 still returns to the condition shown in Figure 2.

It should also be noted that the control lever 22 and the interconnecting element 23 together form a transmission mechanism linking the electromagnetic actuator 20 and the rinse agent dispenser 4, and that this mechanism becomes inoperative when the door of the appliance is opened, returning to its operating condition after the actuator device is first excited upon closing the door and then remaining inoperative for as long as the door remains closed.

In the arrangement according to the present invention, the electromagnetic actuator 20 is conveniently arranged between the receptacle 5 for the detergent or washing agent and the rinse agent dispenser 4. This makes it possible to reduce the depth of the dispenser device 1 as a whole in the area of the detergent receptacle 5. In addition, the transmission mechanism between the electromagnetic actuator 20 and the rinse agent dispenser 4 is made simpler, since it has no two-arm lever, such as those of the prior art devices.

Naturally, the principle of the invention remaining unchanged, embodiments and manufacturing details can vary widely from those described and illustrated purely by way of non-limitative

example, without departing thereby from the scope of the invention as claimed in the appended Claims.